under the control of the parathyroid among other endocrine influences.

2. In the kidneys, where tubular reabsorption of calcium is also under the control exerted by parathormone (in the absence of renal damage).

3. In the gastrointestinal tract, where absorption of ingested calcium from the diet occurs in the presence of vitamin D. At the same time large amounts of calcium (700 to 900 mg) are secreted into the intestinal lumen. Under normal circumstances nearly all of this is reabsorbed and whatever excess above that is contained in the diet is excreted in the feces.

Therapeutic measures to reduce serum calcium, therefore, are logically directed at each of these sites of exchange to induce the flow of ionizable calcium away from the circulatory system. Thus, corticosteroids are advocated for their effect of reducing the inflammatory process surrounding metastatic lesions in the bones, thereby lessening the amount of calcium released from bone. They are believed also to reduce the production of estrogens which may be carcinogenic. Hydration is an obvious though seldom successful method of increasing urinary excretion of calcium. A low calcium diet with the administration of aluminum hydroxide and phosphate may reduce the amount of calcium absorbed from the gastrointestinal tract.

It would appear that the most readily accessible site at which one might direct efforts toward calcium balance is the intestinal mucosa. It is estimated that 900 to 1,100 mg of calcium is absorbed daily by the small bowel. In the presence of diarrhea this must be considerably reduced, as is suggested by the older medical literature, which records hypocalcemia with resultant tetany as a frequent problem in cholera and dysentery.

It seems reasonable to postulate that, with an initial outpouring of calcium from metastatic lesions in bone, a moderate hypercalcemia is produced. This could induce atony of the intestinal musculature and arrest of peristalsis, with resultant increased absorption of calcium and further elevation of the calcium blood level. Thus, a vicious cycle is set up which must lead to death from the effects of hypercalcemia unless it is interrupted.

The patient in the present case had chronic intestinal obstruction for ten days while in the hospital. During this time she was given a diet very low in calcium. She excreted none by bowel and urinary excretion did not vary appreciably despite energetic hydration by mouth and administration of fluid by vein. Since the serum calcium levels fell only following the induced diarrhea and urea nitrogen decreased in direct time relationship on two occasions, it seems not unreasonable to attribute the former to the increase in fecal excretion and the reduction of urea nitrogen to the resulting improvement in renal function. The improvement cannot be attributed to removal of the primary tumor as we at first thought possible, since no vitamin D-like substances were found in the removed specimen. Also the improvement began before the operation. Fear of aggravating the hypokalemia by purgation was not borne out by the seemingly paradoxical rise in potassium level which followed.

Summary

In a patient with severe hypercalcemia associated with metastatic breast carcinoma, renal failure, chronic intestinal obstruction, myocardial irritability and central nervous system toxicity threatened premature death despite therapy by the usually recommended modalities. Then, on two separate occasions a reduction of serum calcium level, clinical improvement and return of renal function came about after drastic purgation. Aggravation of concomitant hypokalemia did not occur.

It is suggested that purgation brought about the improvement by increasing the fecal excretion of calcium and reducing the amount of calcium reabsorbed by the intestinal mucosa.

Further study and experiment to test this simple and readily available means of controlling calcium homeostasis seems warranted.

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Treatment of Riedel's Thyroiditis With Desiccated Thyroid

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THE EFFICACY of thyroid therapy in reducing the size of nontoxic goiters has been documented[2] and amply confirmed.[1,4,5,7,8] These studies demonstrated that goiter due to Hashimoto's disease readily re-

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sponds to thyroid supplementation and that goiter due to diffuse or nodular enlargement also diminishes. although the degree of response is not as great.[1] Heretofore, there has been little comment on using this mode of treatment in Riedel's struma, possibly because chronic thyroiditis of this type is infrequently encountered and also because surgical resection has been the treatment of choice. Hence, it is appropriate to record a case in which thyroid hormone therapy appeared to reverse this disease process.

Report of a Case

A 47-year-old man was first evaluated because of a mass in the left side of the neck that had been present a month and had increased in size two weeks earlier. The only symptoms noted were hoarseness and mild dysphagia, both present for three months. The patient said he felt no pain or tenderness in the mass or in the remainder of the neck and had had no symptoms of inflammatory disease of the respiratory tract. No symptoms of hypofunction or hyperfunction of the thyroid were present, and the body weight had not changed. There was no past or family history of goiter or other disease. However, the patient related that at age 18 he was given six weekly treatments with radium applied externally to the larynx. This treatment was for hoarseness and symptomatic relief followed.

Physical examination revealed a healthy appearing man with normal vital signs. The entire left lobe and isthmus of the thyroid gland were enlarged to three times the normal size and were extremely firm to palpation. No nodules were noted and the gland was not tender to touch. The right lobe was of normal size, smooth, and nonnodular. Lymph nodes in the cervical region were not enlarged.

Leukocyte count, hemoglobin level, sedimentation rate, urinalysis and an x-ray film of the chest were all within normal limits. The basal metabolic rate was + 11.5 per cent, and the serum protein-bound iodine was 6.8 μgm per 100 ml. The thyroglobulin antibody fixation test was nonreactive. The thyroid I^{131} uptake at 24 hours was 14 per cent and the scintiscan of the gland showed no uptake in the left lobe, with normal iodine localization on the right side.

Because of these findings, surgical resection of the gland was performed. At operation, the left lobe was smooth and stony hard, and measured $7 \times 5 \times 4$ cm. The lobe was intimately adherent to the underlying trachea, and the left recurrent laryngeal nerve could not be identified in the tissue mass. The right lobe of the gland was normal in size and appearance, with a small nodule in the upper pole. No lymph nodes were noted in the region. The left lobe and the isthmus of the thyroid gland were resected, and sharp dissection was required to free it from the underlying trachea.

The excised tissue was tan and rubbery firm. On microscopic examination, multiple sections showed dense fibrous tissue with a few compressed, poorly-formed, thyroid follicles. There was a diffuse and focal infiltration with mononuclear and plasma cells and infrequent giant cells. Along one margin of the tissue a ridge of normal-appearing thyroid gland was noted with focal interstitial fibrosis and diffuse mononuclear-cell infiltration. Many blood vessels throughout the fibrous mass showed decided alterations, predominantly of intimal fibrosis and diminution of lumen size. Several of the large vessels had intimal proliferation and diffuse infiltration of the vessel wall by plasma cells and eosinophils. At the edge of the section, a dense fibrosis was present encompassing large collagen fibrils, blood vessels, nerves and striated muscle. The pathologic diagnosis was chronic thyroiditis of the Riedel type.

The postoperative course was uneventful, but the patient noted increased hoarseness. Examination by indirect laryngoscopy revealed left vocal cord paralysis.

Nine months after operation the patient was again examined because of recent onset of swelling in the right thyroid region. Except for mild local pressure symptoms, the patient was otherwise without complaint and had no evidence of hypothyroidism. The right lobe of the thyroid gland was three times the normal size and was woody hard, without nodularity. Regional lymph nodes were not enlarged. Blood cell counts were still within normal limits and a thyroglobulin antibody test was negative. The protein-bound iodine was 6.6 μgm per 100 ml. Thyroid uptake of I^{131} was 18 per cent in 24 hours and the conversion ratio was 7 per cent. A scintiscan showed uniform uptake density in the right lobe but the lobe was slightly diminished in size in comparison with the previous study.

Because of the difficulty of the previous operation, a trial of conservative therapy was decided upon, the patient being given 180 mg of desiccated thyroid per day. Within four weeks the goiter had diminished to half its former size; and after five months the gland was of normal size and the patient asymptomatic except for residual hoarseness.

Comment

As the incidence of Riedel's struma is low (variously estimated at between 0.05[10] and 0.4 per cent[3] of thyroidectomies performed), the opportunities to observe the effect of thyroid substance on the

disease are limited. However, Werner[9] recorded a patient with surgically inoperable Riedel's struma who had decided regression in the size of the gland after administration of full replacement doses of desiccated thyroid. In addition, some of the patients reported by Woolner and coworkers[10] had apparent cessation of the disease process while on thyroid therapy, although the data do not indicate whether or not full replacement doses were given. Conversely, that report also included several cases in which spontaneous regression followed limited and incomplete surgical excision. Indeed, the possibility of spontaneous regression of this disorder was stressed by Riedel himself.[6] However, the prompt diminution in thyroid size, noted in the present case after therapy, with desiccated thyroid, strongly suggests that the hormone was causative.

Recent studies indicate that enhanced endogenous secretion of thyrotropin is the cause of the goiter of Hashimoto's thyroiditis, and that perhaps such a mechanism is operative in other diffuse goiters. This evidence offers a rationale for the effectiveness of thyroid therapy in suppressing thyroid growth, since thyroid-hormone supplementation presumably would inhibit thyrotropin secretion and permit regression of the goiter. No such mechanism can be conjectured for Riedel's thyroiditis, however, since there are no data to support the concept of hyperthyrotropism in this disorder. The pathogenesis remains obscure and therefore any attempt to explain the therapeutic effect observed in this patient would be speculative.

Despite the inability to account for this effect physiologically, the observation is clinically important, if confirmed, since the results of the present method of treatment are not entirely satisfactory. If untreated, severe local-pressure symptoms often develop, and surgical resection is usually incomplete because of the extensive invasion of adjacent structures. Radical operation entails destruction of important contiguous tissue ensues. If these complications could be obviated by a trial of thyroid hormone with regression of the goiter, the benefit to the patient would be enhanced. However, this observation will need amplification through treatment of a large number of patients in this manner to determine if the response is universal. In addition, surgical biopsy of the thyroid gland will still be required to confirm the diagnosis.

Summary

A 47-year-old man with histologically proven Riedel's thyroiditis was observed to have a recurrence of the disorder nine months after operation. There was no evidence of hypothyroidism but after full replacement doses of thyroid hormone were given, the thyroid gland promptly returned to normal size. It is suggested that thyroid-suppressive therapy may be effective in Riedel's thyroiditis, as it is in Hashimoto's thyroiditis.

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Regional Enteritis in Siblings

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SINCE CROHN first described regional enteritis, a great deal of speculation has arisen as to the basic cause of the disease. Genetic factors have always been considered, but to date there has been no definite method to prove or disprove such factors. We have recently seen two siblings in whom the diagnosis of regional enteritis was made within a year of each other.

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